

# PATENT SPECIFICATION

DRAWINGS ATTACHED

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## COMPLETE SPECIFICATION

### A Method of Producing Fine Nozzle Openings of Small Nozzles made of Plastics Material

We, "POLYPLASTE" H. Rolf Spranger  
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ran, Eastern Germany, a German com-  
pany, do hereby declare the invention, for  
5 which we pray that a patent may be granted  
to us, and the method by which it is to be  
performed, to be particularly described in  
and by the following statement:

This invention relates to a method of  
10 producing fine nozzle opening in small  
nozzles of plastics material.

In the production of injection moulded  
or pressed plastics parts difficulties are  
often encountered when such mouldings are  
15 to contain orifices of small diameter. The  
cause of the trouble is that during injec-  
tion moulding or pressing the pressing or  
injecting pressure tends to displace the  
punch a few hundredths of a millimetre  
20 out of true and to create a very small  
clearance between the punch and the die.  
During injection moulding or pressing the  
plastics moulding compounds is squeezed  
into this clearance, and either partly or  
25 completely fills the same, thereby causing  
the orifices in the finished plastics mould-  
ing to be partly or completely closed by a  
troublesome web or flash or residual plas-  
tic.

30 Hitherto this flash of residual plastic was  
removed by drilling or cutting out the ori-  
fices or by grinding away the unwanted resi-  
due of plastic. After drilling or cutting it  
was often found that the troublesome flash  
35 of plastic merely been pushed out of the  
way and that after a time it re-located it-  
self as a result of its inherent elasticity.  
When a flash is ground off the tools tend  
to experience considerable wear and small  
40 orifices are frequently blocked up again by  
the dust generated by abrasion.

Methods hitherto practiced do not there-  
fore readily permit production of satisfac-

tory nozzle orifices which give the desired  
spraying con. Moreover, the unavoidable 45  
dressing off work on such orifices makes  
conventional methods time-consuming and  
expensive.

It is therefore desirable to be able to  
effect the production of small orifices, par- 50  
ticularly the production of very fine nozzle  
orifices in plastics bodies in such manner  
that no mechanical finishing work is re-  
quired and that wear on pressing tools is  
avoided.

Accordingly, one problem contemplated 55  
by the invention is that of providing a suit-  
able method that can replace mechanical  
methods of dressing off existing orifices, and  
of developing the contemplated method in 60  
such a way that the orifices can be pro-  
duced in one operation, i.e. without supple-  
mentary finishing work and without pres-  
sing tools, i.e. substantially without mecha-  
nical aids.

According to the invention there is pro- 65  
vided a method of producing fine nozzle  
openings of small nozzles made of plastics  
material, by passing a spark discharge  
through the body of the nozzles charac- 70  
terised by the use of two coaxially arranged  
high voltage electrodes the tips of whose  
tapered ends face one another to produce  
the spark the arrangement being such that  
at least one of the electrodes is pressed in- 75  
to the plastics part.

In one embodiment the method consists  
in generating a spark discharge by means  
of an a.c. voltage for the duration of two  
consecutive half waves and in introducing 80  
into the spark a stream of gas, preferably  
a hot stream of gas, supplied through  
electrodes which are constructed to func-  
tion as nozzles.

The electrodes may be heated, and may 85  
be made of tungsten-silver-nickel alloy.

It has been found in practice that the perforation obtainable by using two consecutive half waves of an a.c. voltage is sufficient.

5 The introduction of a stream of gas into the spark discharge serves to facilitate the flashover and to guide the same. By pressing the electrodes into the plastics component the spark gap and hence the necessary flashover voltage is reduced. Heating the electrodes facilitates the mechanical penetration of the electrodes into the plastics body.

The proposed tungsten-silver-nickel electrodes suffer substantially no burn-off.

The use of a spark discharge efficiently removes flashes and burrs and a practically circular orifice for generating a desired spray cone can be produced. Moreover, the proposed method permits the desired orifices to be produced in one operation without the use of mechanical tools. The method does not require the provision of highly expensive equipment, it is relatively easy to perform and lends itself to being substantially automated.

The invention will be more particularly described with reference to the accompanying drawing which shows a plastics body in section, as well as electrodes and high tension equipment.

The pointed end of an upper electrode 1 containing an axial bore 2 for passage of a gas stream penetrates about half way through the thickness of a wall 3 of a plastics nozzle body 4, in which wall 3 an orifice is to be formed. A counter-electrode 5 is located below the wall 3 in axial alignment with the electrode 1.

40 The electrodes 1 and 5, are connected by high tension leads 6 and 7 to a high tension generating set 8. The flashover voltage and the duration of the spark discharge are controlled by a control unit 9.

The invention is not limited to the illustrated embodiment. For instance, the bottom electrode might likewise be arranged to serve as a nozzle. Moreover, this electrode might also penetrate into the plastics part. Furthermore, both electrodes might be arranged to penetrate into the plastics, both might be heated and both serve as nozzles.

#### WHAT WE CLAIM IS:—

1. Method for producing fine nozzle openings of small nozzles made of plastics material, by passing a spark discharge through the body of the nozzles characterized by the use of two coaxially arranged high voltage electrodes the tips of whose tapered ends face one another to produce the spark, the arrangement being such that at least one of the electrodes is pressed into the plastics part.

2. Method according to claim 1, characterised in that the spark discharge is produced for the duration of two consecutive half-waves of alternating current.

3. Method according to claim 1 or claim 2 characterised in that a stream of gas is introduced into the spark discharge.

4. Method according to claim 3 wherein the stream of gas is hot.

5. Method according to claim 3 or claim 4, characterised in that the gas stream is introduced through the electrodes which are formed as nozzles.

6. Method according to any one of claims 1 to 5 characterised in that the electrodes are heated.

7. Method according to any one of claims 1 to 6 characterised in that the electrodes are of tungsten-silver-nickel.

8. A method of producing fine nozzle openings substantially as herein described with reference to the accompanying drawings.

For the Applicants.  
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